



UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/362,055	07/28/99	GOSAIN	D P99.1160

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MM92/0815

EXAMINER

SCHILLINGER, L

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 08/15/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trad marks

Office Action Summary

Application No.
09/362,055

Applicant(s)
Gosaln et al

Examiner
Laura Schilling r

Group Art Unit
2813



☐ Responsive to communication(s) filed on _____

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle* 35 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claim

☒ Claim(s) 1-11 is/are pending in the applicat

Of the above, claim(s) _____ is/are withdrawn from consideration

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-11 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☒ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been

☒ received.

☐ received in Application No. (Series Code/Serial Number) _____

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

Art Unit: 2813

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371© of this title before the invention thereof by the applicant for patent.

2. Claims 1-3 and 6-11 are rejected under 35 U.S.C. 102(e) as being anticipated by Zhang et al ('585).

In reference to amended claim 1, Zhang et al teaches a method comprising:

forming a semiconductor film on a substrate (Col.4, lines: 28-32);

forming a hydrogen-containing film on the semiconductor film (Col.6, lines: 1-25);

calculating pulse energy beam for an energy density, a number of pulses, and a pulse width of a pulse energy beam so that the beam does not melt the semiconductor film (this claim limitation is inherent, warping layers/substrates through annealing processes is a well-known semiconductor processing problem, thus annealing steps performed by lasers are distributed in carefully calculated doses to ensure that the substrate and its corresponding layers do not become warped- Zhang teaches laser irradiation and it is inherent that Zhang's laser processing would be

Art Unit: 2813

calculated so as not to melt and warp the substrates layers, because this would render an inoperable device; See also Col.6, lines: 55-65 and Col.4, lines: 35-40);

irradiating said pulse energy beam using calculated values to heat the hydrogen-containing film to diffuse hydrogen in the semiconductor film (Col.6, lines: 57-65).

3. Applicant's arguments filed 6/1/00 have been fully considered but they are not persuasive. Applicant argues that Zhang teaches to thermally anneal the semiconductor device in order to diffuse hydrogen and applicant is correct. However, applicant argues further that the subsequent laser treatment which is performed primarily to crystallize the semiconductor layer does not further diffuse hydrogen. Applicant is incorrect. It is well known that such a laser treatment would cause some amount of hydrogen diffusion. This is an inherent, it would not be possible for the laser treatment to occur without causing some amount of hydrogen diffusion. Therefore, applicant's argument is considered unpersuasive to the Examiner.

In reference to claim 2, Zhang et al teaches wherein the pulse energy beam does not melt the semiconductor film (Col.4, lines: 15-20).

Applicant further argues that Zhang teaches that the laser treatment does melt the semiconductor layer. This argument is very unpersuasive. No where in the specification does Zhang teach such a step, rather Col.1, lines: 15-20 of the Zhang reference teaches that glass has a lower melting point than silicon, a well-known concept. In order for applicant's argument to have merit, one

Art Unit: 2813

must assume that Zhang figured out a process to defy the laws of thermodynamics and treated a silicon layer at such a high temperature that it melted the Si film and yet failed to melt the glass substrate. This is simply not possible. Applicant is essentially arguing that Zhang teaches to irradiate his device at such high temperatures that it would melt Si, melt glass, and render his device inoperable. In the art of semiconductor processing, it is well-known that glass substrates will melt and warp under high temperatures (see Col.1, lines: 15-20) therefore processing limits cannot supersede glass's melting point thus applicant's limitation is an inherent aspect of the prior art and applicant's argument to the contrary is unfounded.

In reference to claim 3, Zhang et al teaches wherein the pulse energy beam is a laser, electron, or ion beam (Col.6, line: 59).

In reference to claim 6, Zhang et al teaches wherein the semiconductor film is polycrystalline, amorphous, or single crystal silicon film (Col.4, lines: 28-33).

In reference to claim 7, Zhang et al teaches wherein the hydrogen containing film is silicon nitride or amorphous silicon, or a combination (Col.6-7, lines: 65-3).

In reference to claim 8, Zhang et al teaches including an absorption layer (Col.4, lines: 55-60).

Art Unit: 2813

In reference to claim 9, Zhang et al teaches wherein the absorption layer is selected from the group consisting of molybdenum, tantalum, and tungsten (Col.4, lines: 55-60) .

In reference to claim 10, Zhang et al teaches wherein the absorption film is silicon (Col.6, lines: 5-8).

In reference to claim 11, Zhang et al teaches wherein the device is a TFT (Col.1, lines: 15-20).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang ('585) as applied to claim 1 above, and further in view of JP 08228010A. Zhang teaches the above steps yet fails to teach wherein the pulse energy density is less to diffuse hydrogen than to recrystallize the amorphous silicon layer. However, Japanese Patent 08228010A teaches a method with two separate laser annealing steps, one to diffuse hydrogen/crystallize the semiconductor layer and

Art Unit: 2813

another to recrystallize the semiconductor layer. 08228010 teaches that the laser energy density of a first crystallization/diffusion step is 300 mJ/cm² (Col.3, lines:40-50) and the energy density of the recrystallization should be between 300-400mJ/cm². Therefore, it would have been obvious to one of ordinary skill in the art to teach the method of Zhang by implementing the two-part laser annealing process of 08228010, since it helps streamline the manufacturing process.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al ('585) as applied to claim 1 above, and further in view of Inou ('461).

In reference to claim 5, Zhang teaches wherein the substrate is plastic (Col.1, lines: 15-20).

However Zhang fails to explicitly teach that the plastic substrate is selected from the group comprising: polyether sulfone, polyethylene terephthalate, polymethyl methacrylate, and polycarbonate.

However, Inou teaches that plastic substrates may be selected from the group comprising: polyether sulfone, polyethylene terephthalate, polymethyl methacrylate, and polycarbonate (Col.7, lines: 25-30).

Art Unit: 2813

Therefore it would have been obvious to one of ordinary skill in the art to combine the plastic substrate taught by Zhang with the materials taught by Inou, because the materials taught by Inou are heat resistant and would prevent substrate warpage.

7.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Art Unit: 2813

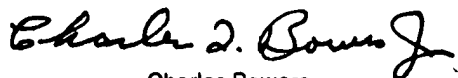
The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hudgens et al ('379) teaches a similar method for a plasma deposited coating and low temperature plasma method and JP 08228010A which teaches a 2-step laser process.

9.

Any inquiry concerning this communication from examiner should be directed to Laura Schillinger whose telephone number is (703) 308-3155. The examiner can normally be reached by telephone on Monday to Friday from 6:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Bowers, can be reached on (703) 308-2417. The fax phone number for the group is (703) 308-7722.

LMS



Charles Bowers
Supervisory Patent Examiner
Technology Center 2800

August 10, 2000